

| NAME P/N QTY | CRIT | FAILURE MODE & CAUSES | FAILURE EFFECT | RATIONALE FOR ACCEPTANCE |
|---|-------|--|---|--|
| RESTRICTOR, ITEM 120A ----- SV785844-17 (1) | 3/1RB | 120AFM01A Restricted flow. Contamination. | END ITEM: Blockage of 02 flow between water tank cavity and suit. GFE INTERFACE: Pressure may rise on water circuit due to regulator 113E excessive leakage. The Item 120B must relieve if pressure exceeds 16 psid to prevent water tank overpressurizat ion and rupture with resulting primary 02 loss. MISSION: None for single failure. Abort EVA if 120B also fails closed and water tank ruptures dumping primary 02. Failure of 120B does not injure crew. CREW/VEHICLE: None for single failure. Possible loss of crewman with additional failure of 120B and loss | A. Design - The orifice inlet and outlet is protected by particulate filters (73 micron). The orifice housing and screens are welded from inconel 625 and nickel respectively, to provide corrosion resistance. B. Test - Component Acceptance Test - An orifice flow test is performed per AT-E-120-1. With the orifice inlet at 14.6 - 15.7 psig and the outlet at ambient, the orifice must flow 182-291 scc/min N2. PDA Test - Performance testing is run per SEMU-60-010. With the orifice inlet pressurized to 15.8-16.0 psig and the outlet at 0 +/- .4 psig, the orifice must flow 173-283 scc/min 02. Certification Test - Certified for a useful life of 25 years (ref EMUM-1418). C. Inspection - Details are 100% inspected per drawing dimensions and surface finish characteristics. Details are manufactured from material with certified physical and chemical properties. All details, gases and test facilities are cleaned and inspected to H53150 EM50A to preclude contamination clogging. D. Failure History - J-EMU-120-006 (3-15-85) -No flow through 120A orifice due to corrosion of internal surfaces by the presence of water. Added water traps to PLSS test stand gas lines and revised in house PDA test procedures. J-EMU-120-A001 (3-27-86) - No flow through 120A orifice due to corrosion of internal surfaces by the presence of water. Corrective action is tracked by J- 120-A003. B-EMU-120-A001 (4-2-87) - No flow through 120A orifice due to corrosion of internal surfaces by the presence of water. Corrective action is tracked by J- 120-A003. J-EMU-120-A003 (5-7-86) - Water was found in relief valve outlet tube. Field procedures changed; after PLSS usage bladders are fully charged and Item 120 gas lines are dried out before storing PLSS. B-EMU-120-A002 (4-28-88) - Restricted flow through the 120A orifice due to corrosion of internal surfaces by the presence of water. Corrective action is tracked by J-120-A003. B-EMU-120-A004 (10-03-88) - Low flow through 120A orifice due to clogging with contamination. Corrective action for this failure is documented and tracked by B-120-A003. B-EMU-120-A006 (1-5-89) - No flow through 120A orifice, due to contamination throughout the valve internal passages. Corrective action for this failure is tracked by B-120-A003. B-EMU-120-A008 (06/15/89). Item 120 high mode relief failed to reseal and orifice failed to flow due to contamination blockage caused by corrosion products leaching from the gas side of the Neoprene water tank bladders. EC's 163402-261 and 163402-262 change sleeve retainer and orifice screen assemblies to reduce corrosion due to humidity. EC 163402-190 creates a new |

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| | | 120AFM01A | of SOP. | configuration water tank (fluorel) bladder which limits corrosive elements caused by diffusion. |
| | | | TIME TO EFFECT /ACTIONS: Seconds. | B-EMU-120-A015 (7/20/92) - During the 120B reseal test, flow through the 120A orifice was 0.135 sccm O2 (spec: 171-284 sccm O2) and suit pressure was 2.195 psig (spec: 4.2-4.4 psig). Investigation revealed that the RPIA test procedure measures the 120A orifice flow rate at a point in the system (T-11) which is influenced by allowable leakage thru other relief valves downstream of the item 120 valve. No corrective action taken. |
| | | | TIME AVAILABLE: Minutes. | |
| | | | TIME REQUIRED: Immediate. | B-EMU-120-A017 (8/18/98) - Low Flow of Oxygen through the I120A Orifice during I120B High Mode Relief and Reseat Check. Spec: 173-283 SCCM. Act: 0.2 SCCM. Low flow caused by contamination from the inlet side of the Orifice Assembly. Changes have been incorporated into the PLSS to eliminate the major sources of contamination to the Item 120 Orifice: Neoprene bladders have been replaced by Fluorel bladders, eliminating the source of bladder leachant contaminants. The stainless steel screen has been replaced by a nickel screen, eliminating corrosion of dissimilar metals between the CRES screen and the Iconel housing. |
| | | | REDUNDANCY SCREENS: A-PASS B-FAIL C-PASS | |
| | | | | E. Ground Turnaround - Tested for non-EET processing per FEMU-R-001, Item 120A Orifice Flow and Item 120B Relief Valve/Relief and Reseat Check. None for EET processing. |
| | | | | F. Operational Use - Crew Response - EVA: No response, single failure undetectable by crew or ground. Training - No training specifically covers this failure mode. Operational Considerations - For single failure, no constraint. EVA checklist procedures verify systems operational status prior to EVA. Real Time Data system allows ground monitoring of EMU systems. |

EXTRAVEHICULAR MOBILITY UNIT
SYSTEMS SAFETY REVIEW PANEL REVIEW
FOR THE
I-120 DUAL MODE RELIEF VALVE
CRITICAL ITEM LIST (CIL)
EMU CONTRACT NO. NAS 9-97150

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